Title: Decimals in the Dugout (Place Value)

Brief Overview:

It's time to play ball with decimals and hit a home run out of *Place Value Park!* Students will explore the concepts of part to whole relationships, place value, and decimals while engaged in baseball related activities. This learning unit focuses on place value to the decimal thousandths. Prior to beginning these activities, students should have a firm grasp of whole number place value through millions. The students will use base-ten blocks, tangrams and other manipulatives in order to gain an understanding of place value with decimals. Students will also have an opportunity to explore comparing decimals with extension activities. So let's root, root, root for the decimal home team!

NCTM Content Standard/National Science Education Standard:

- Numbers and Operations 6, understand numbers, ways of representing numbers, relationships among numbers, and number systems
- Understand the place-value structure of the base-ten number system and be able to represent and compare whole numbers and decimals

Grade/Level:

Grade 4-5

Duration/Length:

3 days with 60 minutes allotted for each lesson

Student Outcomes:

Students will:

- Demonstrate an understanding of place value with decimals
- Read and write decimals in standard, word, and expanded form through thousandths
- Identify the place value of digits in decimal numbers
- Compare decimals through the thousandths

Materials and Resources:

Lesson 1

- Student Resource 1, *The Oriole Bird is in Trouble: Tangram*
- Student Resource 2, *Place Value Through Hundredths*
- Student Resource 3, *Use What You Know*
- Student Resource 4, *Place Value Mat (laminated prior to lesson)*

- Teacher Resource 1, *The Oriole Bird is in Trouble: Story*
- Teacher Resource 2, *The Oriole Bird is in Trouble: Tangram Answers*
- Teacher Resource 3, *Student Observation Notes* (make enough copies for all 3 days of the unit)
- Teacher Resource 4, *Decimal Flash Cards* (precut and laminated)
- Teacher Resource 5, *Use What You Know Answer Key*
- Teacher Resource 6, *Place Value Through the Hundredths Answer Key*
- Transparency of Student Resource 1 (pieces should be colored and cut out prior to lesson)
- 1 pair of scissors for every two students
- 1 bag of base-ten blocks containing 1 flat, 10 rods, and 100 units for each student
- Overhead Base-Ten Blocks
- Dry erase markers
- Number cubes (re-teach groups only)
- Blank transparencies for overhead note taking during teacher facilitation

Lesson 2

- Student Resource 5, *Batting Average Place Value*
- Student Resource 6, *Major League Batting Averages*
- Student Resource 7 a-b, *Batting Average Baseball Cards* (cut and bagged for each student prior to lesson)
- Teacher Resource 4, *Decimal Flash Cards* (use cards from previous day)
- Teacher Resource 7, *The Better Batter* (transparency)
- Teacher Resource 8, *Major League Batting Averages Answer Key*
- Transparency of Student Resource 5
- Bean bag or foam ball
- Transparent Decimal Squares
- Number cubes (reteach groups only)
- Blank transparency sheets for overhead note taking during teacher facilitation
- Scratch paper
- Construction paper (extension groups only)
- Glue (extension groups only)

Lesson 3

- Student Resource 8, *Homerun Derby*
- Student Resource 9, *World Series Challenge* (summative assessment)
- Teacher Resource 9, *Number Cards 0-9* (precut and laminated before lesson)
- Teacher Resource 10, *Place Value Cards* (precut and laminated before lesson)
- Teacher Resource 11, *World Series Challenge Answer Key*
- Transparency copy Student Resource 8, *Homerun Derby*

- Stickers (any kind for Homerun Derby prizes optional)

Development/Procedures:

Lesson 1
Pre-Assessment/Launch –

- Distribute Student Resource 1, *The Oriole Bird is in Trouble: Tangram* and a pair of scissors to every two students. Instruct the class to leave the materials in the corner of the desk, face down. Tell the students they will be listening to a story and then solving a puzzle.
- Read Teacher Resource 1, *The Oriole Bird is in Trouble: Story.*
- Give the students 10 minutes to find how much the Oriole bird has to charge for each piece of the base in order to pay back the team. Encourage the students to use their scissors to cut apart the tangram.
- Invite pairs of students to share their solutions using the overhead and transparency pieces (Answer key is on Teacher Resource 4).

Teacher Facilitation –

- Explain to the students that they will be exploring decimals and their place value.
- Refer back to the labeled tangram pieces on the overhead. Ask the students if they see any decimals.
- Question the students to reveal part to whole relationships. Ask, "What part of one dollar is $0.50?"
- Distribute pre-made bags of base ten blocks (1 flat, 10 rods, 100 units) Ask the students which block best represents a dollar. Have the students think, pair, and share their ideas. Explain that the flat is the best model because it represents 100 and there are 100 pennies a dollar.
- Guide the students through place value using decimals by using the following explanation that was obtained from page 30 of <u>The Super Source: Base Ten Blocks</u> published by ETA Cuisenaire 2000. Have the students use their base ten blocks during the explanation. (text in italics is cited material)
- *Display the overhead flat. Instruct the students to cover their flats with rods. Ask the students how may rods are needed to cover the flat. Acknowledge that 10 rods are needed to completely cover a flat.*
- *On the overhead write and explain that if the flat is the value of a whole (1), then the value of each rod is one-tenth.*
- *Write 0.1 on the transparency. Explain that this is the decimal form of the fraction. This may also be represented by a dime or 0.1 of a dollar.*
- *Write 0.3 on the overhead. Have the students use their base ten blocks to form this number. Have the students do that same with 0.9, 0.4, and 0.7. Let volunteers show the answers using the overhead manipulatives. *Walk Around to observe students and record observations.*
- *Display the unit block on the overhead. Ask the students how many units would be needed to cover 1 flat. Let students volunteer their thinking.*

Acknowledge that 100 units would be needed to cover the flat. Explain that because the value of the flat is 1 then each unit has the value of one hundredth of 1.

- *Write 0.01 on the transparency. Explain that this is the decimal form of the fraction. This may also be represented by a penny or 0.01 of a dollar.*
- *Write 0.14 on the overhead. Have the students use their base ten blocks to form this number. Display that there are two solutions- with 1 long and 4 units and 14 units. Have the students do that same with 0.23, 0.96, and 0.57. Challenge the students to represent each number two was with the base-ten blocks. Let volunteers show the answers using the overhead manipulatives.*
- Explain that, like whole numbers, decimals have place value names, and it is important to mention these names when we say and write decimals.
- Turn off overhead and direct students to the chart drawn on the chalkboard:

Ones	**.**	**Tenths**	**Hundredths**	**Expanded Form**	**Word Form**
	.				
	.				
	.				
	.				

- Write 9.82 seconds on the chalkboard. Tell the students that it takes a hot dog vendor at Camden Yards 9.82 seconds to put mustard and ketchup on a hotdog. Model how to fill out the chart.

Ones	**.**	**Tenths**	**Hundredths**	**Expanded Form**	**Word Form**
9	.	8	2	9+0.8+0.02	Nine and eighty-two hundredths

- Write 4.37 seconds on the board. Tell the students that it takes Brain Roberts 4.37 seconds to run from home plate to first base. Work together as a class to fill out the chart.

Ones	**.**	**Tenths**	**Hundredths**	**Expanded Form**	**Word Form**
9	.	8	2	9+0.8+0.02	Nine and eighty-two hundredths
4	.	3	7	4+0.3+0.07	Four and thirty-seven hundredths
	.				
	.				

- Continue to call students up to the board to complete the following examples:
    - The time it takes the Oriole Bird to sign an autograph: 5.60 seconds
    - The time it takes a homerun ball to travel from home plate out of the park: 8.91 seconds.
- Distribute Student Resource Sheet 4, *Place Value Mat*, and a dry erase marker to each student in the class. This worksheet is a blank copy of the place value chart on the board.
- Instruct the students to complete their chart for the following examples:
    - 1.19
    - 5.01
    - 9.94
    - 4.80
    - 2.36

Student Application –

- Distribute Student Resource 2, *Place Value Through The Hundredths*, to each student in the class.
- Explain to the students that this worksheet is to be completed alone. Answer key is on Teacher Resource 6.
- Allot 5 minutes to the students for completion of this activity.

Embedded Assessment –

- While students are engaged and working during the launch, teacher facilitation, and student application walk around the classroom and observe the conversations and thought processes. Record anecdotal notes on Teacher Resource Sheet 3, *Student Observation Notes*.
- After summarizing the lesson at the end of the period, introduce the decimal flashcards, Teacher Resource 4, *Decimal Flashcards*. Show a flashcard to each student. The student must say the word form of the decimal before they may line up to go to their next class.

Reteaching/Extension –

- Use the data and observations gained from the launch, teacher facilitation, and student application to determine if a re-teach group is needed. Have students roll a number cube three times to create a decimal. Use the place value mats from teacher facilitation to record the decimals in expanded and word form.
- Use the data and observations gained from the launch, teacher facilitation, and student application to determine which students would benefit from extension activities. These students will complete Student Resource Sheet 3, *Use What You Know*. This activity allows students to use their knowledge of decimal place value to compare decimals. Answer key is on Teacher Resource 5.

Lesson 2

Pre-assessment –

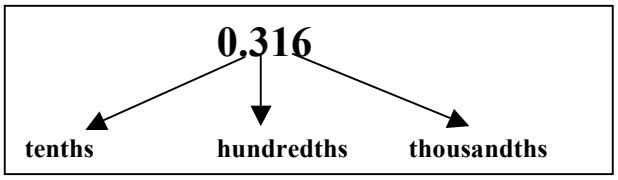
- Play *Pitching Practice* with group.
- Throw a beanbag or foam ball to a student. Show the student a decimal flashcard from the previous day's lesson. Have the student tell you the decimals value in word form. Make sure the student uses the proper pronunciation of ones and tenths. Also have the student tell you the value of one of the digits in the decimal.
- Play the game until each student has had a turn or 5 minutes have passed

Launch –

- Display Teacher Resource 7, *The Better Batter*, on the overhead.
- Explain the scenario to the students. Give the students 5 minutes to solve the word problem with a partner.
- Encourage the students to use scratch paper and picture to help them solve the problem.
- Invite pairs of students to explain their solutions at the overhead projector.

Teacher Facilitation –

- Using the overhead and a blank transparency write the decimals 0.316, 0.361, 8.09, and 6.47 Explain that these decimals appeared while the class played *Pitching Practice* and solved the better batter problem.
- Ask the students what they notice about these numbers. Acknowledge that there is an extra decimal place.
- Display the Transparent Decimal Squares. Use the squares to model the value of Javy Lopez's batting average.
- Label the place values of each number in the batting average.



- Explain the difference between the hundredths and thousandths place.
- Repeat explanation and model with Miguel Tejada's 0.361 batting average.
- Ask the students who has the better batting average. Listen to responses, and explain how to compare decimals.
- Distribute Student Resource 5, *Place Value Mat*, to the class and display a transparency copy on the overhead.
- Model completing the chart with the batting average 0.316.
- Together as a class complete the chart using the batting average 0.361.
- Inform the students that Brian Roberts's batting average is 0.306. Instruct the students to work with a partner to record this average on their charts.

- Allot 3 minutes for the students to work together. Invite students to fill in the overhead chart with the correct answers.
- Inform the students that Corey Patterson's batting average is 0.283. Instruct the students to work alone to record this average on their charts.
- Allot 3 minutes for the students to work alone. Invite students to fill in the overhead chart with the correct answers.

Student Application –

- Distribute Student Resource 6, *Major League Batting Averages*. Emphasize that these worksheets are just like the place value mats the students just worked on. The only difference is that there is a space for a baseball player's name.
- Distribute the bags of baseball cards to each student, Student Resource 7a-b, *Batting Average Baseball Cards.*
- Instruct the students to pick a baseball card and record the player's name, batting average, expanded form, and word name. Explain that the students must repeat these steps until all cards have been used. Allot 10 minutes for this activity.

Embedded Assessment –

- While students are engaged and working during the launch, teacher facilitation, and student application walk around the classroom and observe their conversations and thought processes. Record anecdotal notes on Teacher Resource Sheet 3, *Student Observation Notes*.

Reteaching/Extension –

- Use the data and observations gained from the launch, teacher facilitation, and student application to determine if a reteach group is needed. Have students roll a number cube three times to create a decimal. Use the place value mats from teacher facilitation to record the decimals in expanded and word form.
- Use the data and observations gained from the launch, teacher facilitation, and student application to determine which students would benefit from extension activities. These students will be instructed to order the batting averages on their baseball cards from greatest to least. Then the students will glue their solution to construction paper and explain their rationale below the response. This activity allows students to use their knowledge of decimal place value to compare and order decimals.

Lesson 3

Launch –

- Distribute Student Resource 8, *Homerun Derby*, to the class.
- Display Student Resource 8, *Homerun Derby*, overhead.
- Explain to the students that they will be playing a place value game. The object of the game is to earn points by correctly placing a number on the

place value chart. But there is a catch. They must place the numbers on the chart but no one knows, not even the teacher, where they should go.

- Model the game using the overhead transparency. Use the following explanation:
    - Say: "I have 10 cards that are numbered from 0-9. I am going to pick a card. I am going to place that card on the chalk ledge."
    - Pick the four and place it on the chalk ledge.
    - Say: "Now I am going to record the number four on my homerun chart. I think I will put it in the ones place."
    - Say: "Now I am going to draw another number and place that number somewhere on the chart."
    - Pick a seven and place it on the chalk ledge to the right of the four.
    - Say: "I think I will put the seven in the thousandths place."
    - Say: "I need to draw two more numbers."
    - Draw a nine, and place it to the right of the seven. Then, draw a zero and place it to the right of the nine.
    - Say: "I think I will put the nine in the tenths place and the zero in the hundredths place. Remember you may put the numbers wherever you want them. Once you write a number down on the chart, you may not change it." The transparency should look like this:

Round 1

ONES	.	TENTHS	HUNDREDTHS	THOUSANDTHS
4	.	9	0	7

The number cards should be arranged on the chalk ledge like this:

4	**7**	**9**	**0**

    - Say: "Now it is time to try to score a homerun! I have four cards in my hand. Each one has a different place value written on it; ones, tenths, hundredths, and thousandths."
    - Show the cards to the students.
    - Say: "I am going pick one of the place value cards for every number I have chosen. I am going to pick a place value card for the number four first. If the place value I pick matches where I put the four on my chart, then I hit a homerun. If it doesn't match, then I struck out. When I hit a homerun I earn one point. The students with the most homeruns at the end of each round get a sticker (stickers are optional). Let's see how well I did!"
    - Draw the ones place value card.
    - Say: "Well look at that. I put the four in the ones place. I scored a homerun! Must be beginner's luck."

    - Circle the four on the transparency so that it shows that you hit a homerun.
    - Say: "Now let's see if I put the seven in the right place."
    - Draw the hundredths place value card.
    - Say: "Looks like I struck out on that one!"
    - Draw a line through the seven on the transparency to show that you struck out.
    - Draw the tenths place value card next.
    - Say: "Looks like I hit a homerun! I choose to put the nine in the tenths place."
    - Circle the nine on your example to show that you hit a homerun.
    - Say: "Well, I know that the next card is the thousandths. But I chose to put the zero in the hundredths place. I have two homeruns."
    - Draw a line through the zero on the transparency to show that you struck out. Record your score in the box provided.
    - Ask the students if there are any questions. Remind the students that they may not move a number once it is written on their paper.
- Play three rounds of Home Run Derby.
- * Optional-Award stickers for each round. There may be multiple winners every round.

Teacher Facilitation –

Tell the students that so far they have your vote to go into the decimal hall of fame. Explain that it is time for the World Series Game. Today they are going to be major league mathematicians and show everything they know about decimal place value.

- Distribute Student Resource 9, *World Series Challenge.* Tell the students that they are to keep their worksheets face down until directed to turn them over.
- Remind the students that this worksheet is to be completed individually. * Optional- Remind them that spelling counts.
- Allot 20 minutes for the summative assessment.

Student Application –

- Have the students complete the assessment.

Embedded Assessment –

- Walk around the classroom and observe student conversations and thought processes, while students are engaged and working during the launch and student application. Record anecdotal notes on Teacher Resource Sheet 3, *Student Observation Notes*.

Reteaching/Extension –

- Provide extra time and explicit reading of written directions for any English Language Learner.

- Provide struggling students with base-ten blocks and place value mats as hands-on manipulative.

Summative Assessment:

- Distribute Student Resource 9, *World Series Challenge.* Tell the students that they are to keep their worksheets face down until directed to turn them over. Remind the students that this worksheet is to be completed individually. * Optional- Remind students that spelling counts.
- Allot 20 minutes for the summative assessment.

Both selected response questions and brief-constructed response questions appear on this summative assessment. The items contained within the assessment address the following objectives:

  - Students will read and write decimals in standard, word, and expanded form through thousandths.
  - Students will identify the place value of digits in decimal numbers.
  - Students will compare decimals through the thousandths.

- Check student responses using the answer sheet that can be found on Teacher Resource 11.

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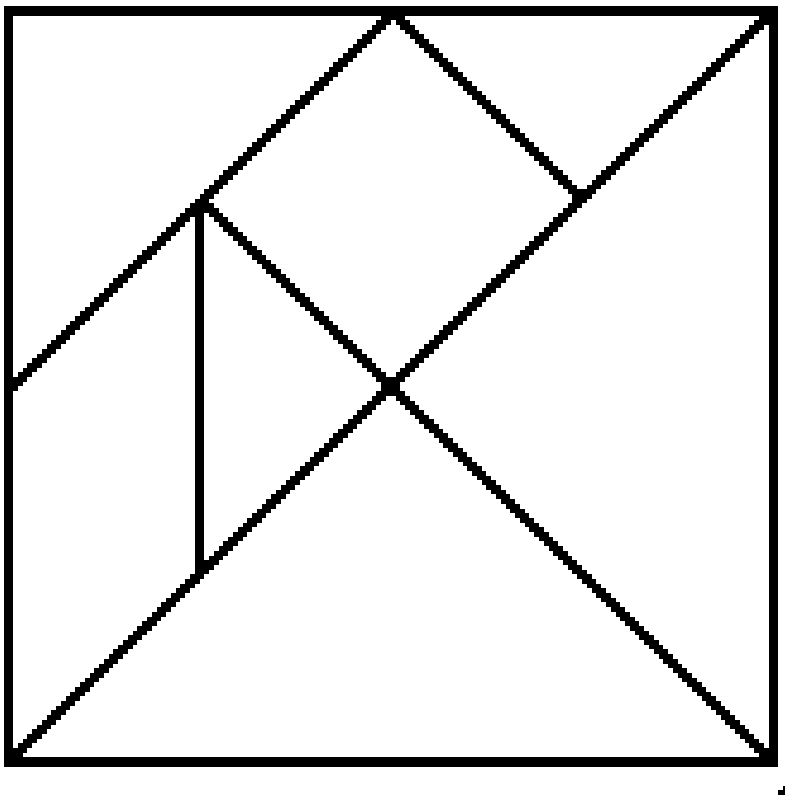
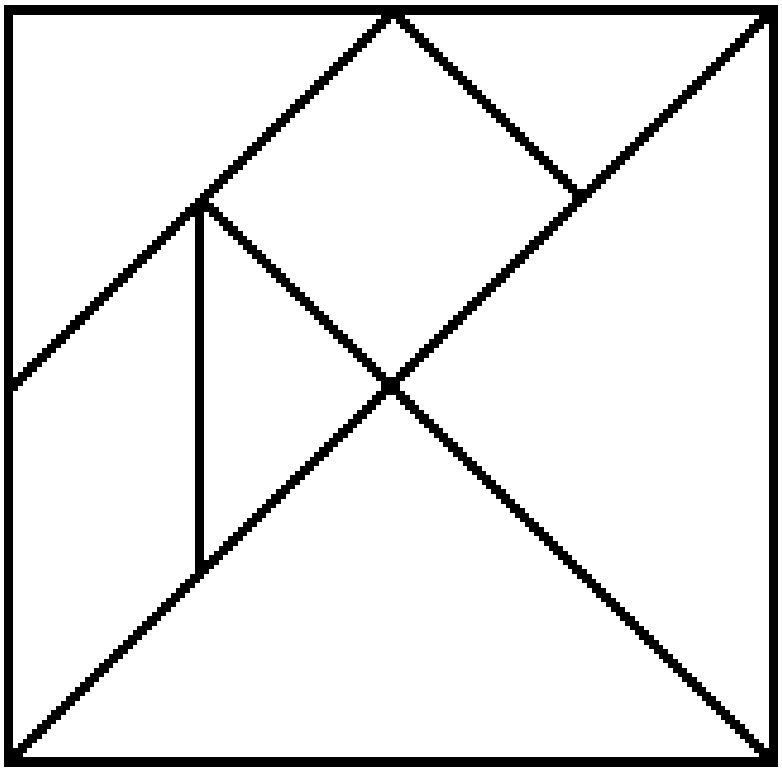
The Oriole Bird is in Trouble: Tangram





Name: _____

Place Value Through the Hundredths

Here are different ways to represent 1.75.

Place Value Chart:

Ones	.	Tenths	Hundredths
1	.	7	5

Word Form: One and seventy five hundredths

Expanded Form: 1 + 0.7 + 0.05

The value of the 7 is 7 tenths. The value of the 5 is 5 hundredths.

Write the word name for each number and tell the value of the underlined digit.

1. 6.0<u>2</u> _____

_____

2. 5.<u>3</u> _____

_____

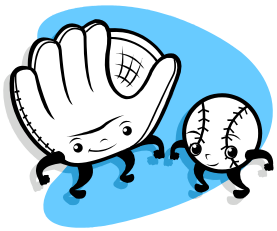
Write each number in standard form.

3. 7 + 0.7 + 0.04 _____

4. Four and fifty eight hundredths _____

Write the number in expanded form.

5. 4.34 _____ **6.** 8.25 _____



Use What You Know!

Predict using the symbols <, >, or =.

1. 567 ☐ 563
2. 0.2 ☐ 0.20
3. 0.4 ☐ 0.04
4. 6.0 ☐ 6

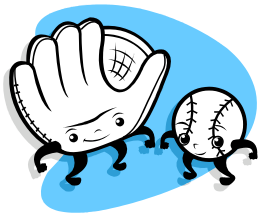
Write the word form for each number.

5. 2,397 _____
6. 0.38 _____

Write each number in expanded form.

7. 9,477 _____
8. 3.51 _____

Use What You Know!



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